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Assessment of Challenges and Opportunities of Bee Keeping in and Around Gondar

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Abstract: This study was conducted in and around north Gondar zone in Amhara region. The objective of this study was to assess the challenges, opportunities and future prospects of bee keeping. The results of this study indicated that beekeeping is one of the most important income generating activities besides other agricultural activities. Based on the result of this study, it was found that this area has untapped potential for bee keeping development. Among the major opportunities of bee keeping in the study area were existence of flowering plants and ample source of water, availability of honey bee colonies and materials. On the other hand, the major challenges that hinder the untapped potential of beekeeping were lack of bee forage, shortage of rainfall, agro-chemical poisoning, pests and predators, absconding and lack of honey storage facilities. In order to avoid and come up to the success in bee keeping activities efforts should be geared to alleviate the main constraints that hindered bee keeping development of the area. Therefore, there is a great need of attentions in policy of drought resistance honey bee floras, conservation of existing vegetation, integrating bee keeping with agro-forestry and crop production and increasing the distribution of moveable frame hives.

Key words: Bee Keeping · Constraints · Gondar · Honey · Opportunities

INTRODUCTION

Ethiopia is one of the continents which has the largest honey population and owns big potential of honey bee production. Owning to its varied ecological and climatic conditions, Ethiopia is home to the diverse flora that provides surplus nectar and pollen to bees. Moreover, bee keeping is an appropriate and well adapted farming practice to extensive range of ecosystem of the country. Today, over ten million of bee colonies are found in the country, which includes both undomesticated and hived ones [1].

Ethiopia is the largest honey producer in Africa and 10^{th}largest honey producer all over the world. In addition to this considerable amount of bees wax is produced in the country on world level, Ethiopia is the 4^{th} in bee wax production [2]. The country, having the highest number of bee colonies and surplus honey source of flora, is the leading producer of honey and bee wax in Africa. With a honey production in the country is estimated at 50,000 metric tons per year and is said to represent only 10.7% of the country's production potential. Ethiopia produces around 23.6% and 2.1% of total African and world's honey, respectively [3]. However, of the total honey produced in the country only small amount in marketed [4].

Since the late 1970s, attempts have been made to improve the productivity of bee keeping of the country through introduction of improved technologies. Moreover, since 1993 strategies on "bee honey source development package" have been formulated and are under implementation in most regions of the country. Never the less, the level of bee keeping still remains in the traditional system and more than 99%of bees are still kept in traditional hives with its various limitations [5]. Because of this and other reasons, the country could not produce adequate table-honey for local and export markets.

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This indicates that the efforts of made to exploit the apicultural resources potential of the country are not satisfactory. Therefore, the products obtained for this subsector are still low as compared to the potential of the country [6].

Though Ethiopia diverse and unique flowering plants suitable for beekeeping, the beets and the plant like all renewable natural resources are constantly, under threat from lake of knowledge and appreciate on these endowments [2]. The principal resource base for beekeeping has become seriously divested in the course of time the potential of Ethiopian land scale for honey production does now, understudy and only constitute a small fraction its former wealth. Moreover, the obstruction of the remaining resource base can be observed going on at a steadily accelerating pace [7]. An investigation indicates that the number of the honey bee colonies in the country has been declining and consequently the honey and bee wax production as well as export earnings fall down [5].

Moreover farming system approach to research and development work is recognized as one of the most appropriate method used to diagnosis and gaining knowledge of the technologies and describes actors affecting production at farm level [8].

Starting from the past 30 years, modern beekeeping was in to due in the country, but the amount of table honey from box hives is still very small. So, the demand for table honey could not be satisfied and will not be soon which is currently less than 4% of the total honey production of the country [9].

Thus, this study was conducted to improve honey bee production in certain area through research the opportunities and challenges should be supported by two specific objectives:

- To asses and evaluate the existing beekeeping practices in and around Gondar.
- To identify the major problems and constraints limiting beekeeping activities and possible solution in the study area

MATERIALS AND METHODS

Description of the study area: The study was conducted in and around north Gondar administrative zone of Amhara region, which is located in the northwestern part of Ethiopia. It is located 738km northwest of the capital, Addis Ababa. The study zone is located between geographical coordinates 12.3° to 13.38 north latitudes and 35.5° to 38.3° east longitudes and the altitude ranges from 550 to 4620 meters above sea level which is randomly and independently distributed with in western lowland and in north Semen Mountain respectively. The average annual rain fall varies from 880mm to 1772 mm, which is characterized by monomodal type of distribution. Minimum and maximum temperatures are 10°c in highland and 44.5°c in the lowland [10].

Sampling Techniques and Sample Size: Formal types of study were carried out to collect primary data through structured questionnaires developing for the purpose of interviewing the farmers. Beekeepers were randomly selected to collect the necessary data on challenges, opportunities and future prospects of beekeeping in the area. From this area, 120 samples of hives (102 traditional, 12 transitional and 6 modern) hives were randomly selected from 32 sample respondents.

Methods of Data Collection and Analysis: In this study, both secondary and primary data were used to generate qualitative and quantitative information. To collect primary information household survey, interviews with focused groups and key informants and personal observation were undertaken. The secondary data relevant to this study were collected from published and unpublished sources of Holeta Bee Research Center, Ministry of Agriculture, north Gondar Agriculture and Rural Development Office. Prior to the actual survey, information was gathered through informal survey and based on which the information obtained from secondary data and informal survey, a semi-structured questionnaire was developed. Both qualitative and quantitative data were interpreted by descriptive statistics. The analyzed data was organized in the form of table, using percentage, rank and average.

RESULTS AND DISCUSSION

Sex and age of the respondent: From the total of 32 sample respondents were interviewed to generate qualitative and quantitative data based on beekeeping activities 12.5%were female and 87.5% were male. This indicates that beekeeping activities are mainly performed by men although it could be done by any sex composition of the respondents.

Table 1: Sex Distribution of the Respondents

Sex	No	No of respondent	%
Female	1	4	12.5
Male	2	28	87.5
Total		32	100

Table 2: Educational Status of Respondents

No	Educational status	No of respondent	%
1	Illiterate	5	15.6
2	Primary school	20	62.5
3	Secondary school	7	21.9
Total	32	100	

Table 3: How start bee keeping

No	Reasons to start bee keeping	Noof respondents	%
1	Self-interest	25	78.125
2	Catching	4	12.5
3	Inheritance	3	9.375
Total		32	100

The average age of the sample respondents were 46.5 years ranging from 20 to 70 years. This results confirms with [11] and however, as a result of this survey, the working force of the society with in the area has to be below 18 and above 70.

Education Status of the Respondents: Education is an important and one entry point for fast transfer of knowledge on improved beekeeping. Moreover, educational level of the farming households may have significant importance and determining the type of development and extension service approaches [12].

Based on educational status of the sample beekeepers 15.6% of the respondents have not attended any education while 62.5% and 21.9% attended primary and secondary school, respectively. Based on the study, the illiterate one limits the effectiveness of the product in improved bee keeping activities.

Beekeeping Practice in the Study Area: Beekeeping in the study area has been practiced as sideways with other agricultural activities. Based on the study, there were no any respondents who base their livelihood only this sector. By depending on their level of economic status, three type of bee hives have used by the sample beekeeper farmers in the area. These were traditional, top bar (transitional) and movable frame (modern) bee hives.

Traditional Beekeeping: The sample respondents have greater number of traditional hives because they have easily constructed from locally available materials such as clay pots, woven grasses. The productivities of one fixed comb hive were 7 to 15kg/ hive that harvested 1 to 2 or 3 times per year depending on honey bee flora but the honey production is not that much compare to other beekeeping system.

Frame Hive and Top Bar Hive Beekeeping: Based on the study, the only problem for constructing top-bar hive (TBH) by beekeepers were inabilities keeping the specific size of top-bars. Due to this problem the hive distribution was very low. However, the productivity is greater than fixed comb hives next to movable frame hives. Top-bar hive has proved to be the most appropriate because of its low cost and the fact that the beekeepers or local carpenters can easily construct it [13].

Modern beekeeping hive consists of precisely made rectangular box hives super imposed one above the other in tire and increase as bee population increase and decreases likewise [13] but it requires high investment cost and trained man power. According to the respondent's response, the productivity of honey from the hive was good that honey harvesting ranging from 30-50 kg per hive. This agrees with the potential area of honey production from this hives (HBRC), but disagrees with [14].

Honey Production: The average amount of honey harvested from traditional, top bar and frame hive were 10.5kg, 16kg and 18kg per hive respectively. The result obtained from traditional hive is higher than the national average yield (5kg) and the result reported by [15], that states the average amount of honey harvested per traditional hive in west, south west and north Shoa zones was 6.2kg.The sample respondents harvest honey in two distinct harvesting seasons, that is, from September to end of November and April to end of June. Majority of the respondents harvest their honey during autumn season. As the result of Table 3 indicates, about 78.125%, 12.5% and 9.375% of the respondents were started bee keeping by self-interest, catching and inheritance respectively.

According to this survey, the reason for involvement of bee keepers activity are income generating that used for different household expenses and thought as assistance for their lively hood with other agricultural activities

Major Constraints of Apiculture: According to the result of this survey, the major constraints that hinder apiculture sub sector in the study area indicated in (Table 4) below.

Table 4: Major constraints of beekeeping in the study area

Constraints	Rank	%
Lack of rain fall	1	28.25
Shortage of bee forage	*2*	*23*
Application of chemical	3	18
Pest and predator	4	15
Absence of policy in apiculture	5	10
Others	6	5.75

Table 5: Major Pests Identified in and Around Gondar

		Type of damage			
Pests and predator	Season of incidence	Honey bee	Bee brood	Hive	Bee product
Ants	Year round				
Birds	April-July				
Spiders	Year round				
Honey badger	Year round				
Termite	June-September				
Snake	Year round				
Wax moth	May-September				

Table 6: Techniques used by bee keepers to protect pests and predators

Pests	Protection technique
Ants	Place fresh ashes around the base of the hive stand, plastering hives stand with mud, spraying garlic juice, burning the ants with fire, destroying the ants nest and keeping weeds well away from the base of the hive stand.
Wax moth	Fumigating with cotton clothes, rubbing with recommended plant material
Birds	Killing using 'wonchif and whipping'
Spiders	Removal of spider's web and killing it
Termite	Destroying the nest
Honey badger	Killing, fencing, chasing with dogs
Snake	Killing, smoking with some plant materials

Based on the response of beekeepers and available information it has a series problem particularly during the winter season, which results poor plant performance. Therefore, in this regard the beekeepers has to provide supplementary feed to his or her colony, planting drought resistance bee forage around their apiary and provide water.

Shortage of Fee Forage: Shortage of bee forage leads a devastating problem that retards the production and productivity of honey bee colonies especially during the dearth period. This constraint is highly associated with lack of rain fall and insufficient availability of bee forage. So, the beekeepers should apply the above problem solving techniques that are taken as a measurement to control the effect of lack of rainfall.

Application of Chemicals*:* Application of chemicals such as fungicides, pesticides and herbicides hinder the productivity and production of honey bee colonies. Therefore, focus should be given to those chemicals, which are not harm full to honey bees and the application should not match with flowering seasons to minimize the poisoning effect on honey bee.

Prevalence of Pest and Predator: The prevalence of pests and predators are interesting with life of bees. According to [14] ants, honey badgers, bee eater birds, wax moth, spiders, termites, snakes cause devastating damage to honey bee colonies and products within a short period of time.

Absence of Policy in Apiculture Sector: The life stock sector not only in and around Gondar but also in Ethiopia has probably suffered more than crops and crop sectors from inappropriate government policies and the apiculture sub sector is no exception. So to improve and sustain apiculture sector the government give special attention to it.

Along with the identifications, bee keepers of the area have a serious concern and have various practices in controlling the above and other pests.

Scarcity of Beekeeping Equipment: As the study indicated that the level of beekeeping is still traditional and has various limitations. An introduction of improve beekeeping technology to rural communities are beyond the power of them and not easily available for these who can afford it. Most of local beekeepers lack of basic tools such as bee veil, hand gloves, smokers and others [16].

Conclusion and Recommendation: However, TBH is preferred for better quality and quantity of honey. Moveable hive is the best and most preferable hive to get high quality of honey and appropriate for management. However, according to the result of this study, various constraints have been bottleneck to exploit the untapped potential of bee keeping industry. The major ones are lack of rain fall, lack of bee forage, existence of pests and predators, lack of promising market lack of bee keeping information and existence of high temperature and wind. Although these days, improved beekeeping technologies are being introduced by the government, the existing system of their management by the householder was similar to local type of beekeeping system.

Recommendation: From this study the following recommendations should be suggested for the present and future works in apiculture sub sector. Further studies should be under taken for confirming species diversity and composition of honey bee floras. Promotion of cooperation among the bee keepers through apiculture measures should be strengthened and sharing and make the measures more effective and relevant. Farmers should be utilizing chemicals aimed at minimizing the effect of pesticides on honey bee.

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